Resting stem cells are cancer-prone

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CIRM grantees at University of California, San Francisco, have published a *Cell Stem Cell* paper explaining why blood-forming stem cells accumulate cancer-causing mutations with age. Basically, they found that inactivity is genetically risky for the cells.

The blood-forming stem cells exist in the bone marrow where they divide periodically to form new cells of the blood system, including red blood cells, immune cells and platelets. When the cells are actively dividing they use a highly effective mechanism for repairing any damage to their DNA. The danger comes during the down-time. When the cells -- also called hematopoietic stem cells -- aren't dividing they use a less rigorous method for repairing DNA damage, which can be caused by radiation, drugs, or regular wear and tear.

In a press release from UCSF, the lead author Emmanuelle PasseguÃ© said:

> "Our results demonstrate that quiescence is a double-edged sword, protecting hematopoetic stem cells from cellular stress but rendering them intrinsically vulnerable to mutagenesis following DNA damage."

Passegue is associate professor of medicine (division of hematology/oncology) and a member of the Eli and Edythe Broad Center of Regeneration Medicine and Stem Cell Research. She also received a CIRM New Faculty II Award, which funded this work.

A review that accompanies the paper says:

> Because many hematopoietic disorders that stem from DNA damage accrual arise during aging, these results also stress the importance of examining DNA damage response and damage accrual during ontogeny and aging.

Cell Stem Cell, August 6, 2010

A.A.

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